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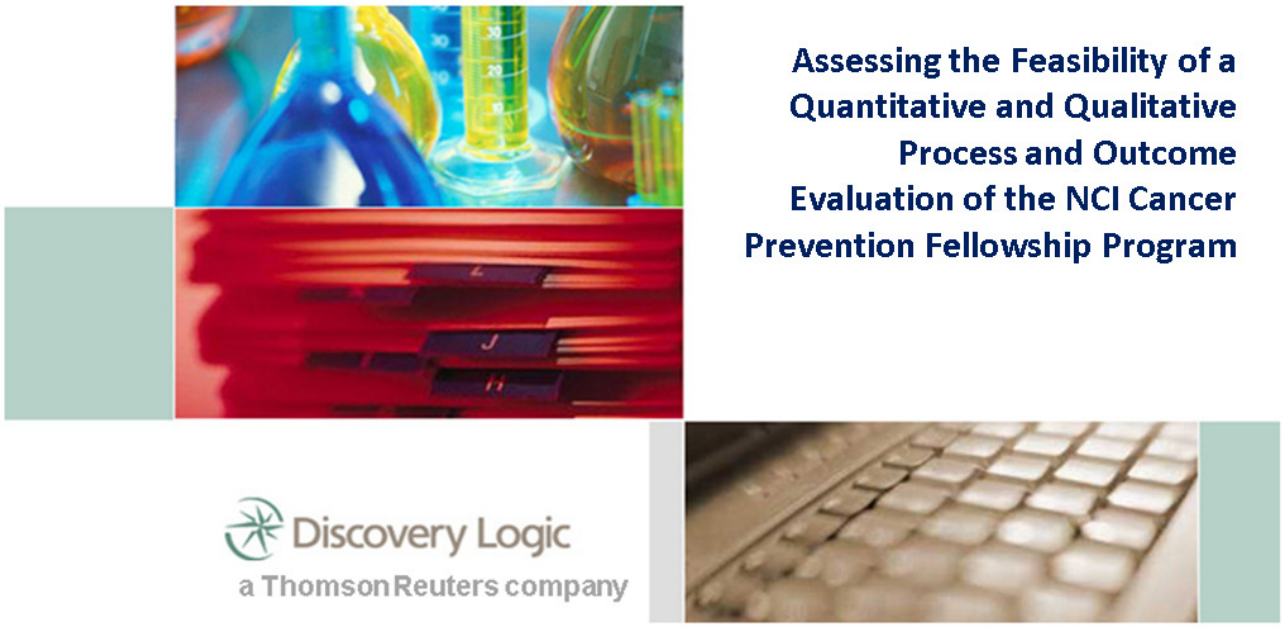
Final Report for HHS



Assessing the Feasibility of a Quantitative and Qualitative Process and Outcome Evaluation of the NCI Cancer Prevention Fellowship Program

Discovery Logic
a Thomson Reuters company

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1	May 13, 2011	Di Cross, Joshua Schnell, Unni Jensen	--
2	May 18, 2011	CPFP via conference call May 17, 2011	Added recommendation summarization table with pros and cons to executive summary and Section V.
Final	June 14, 2011	--	Incorporated cost and timeline estimates.

Executive Summary

A full-scale evaluation of the National Cancer Institute (NCI) Cancer Prevention Fellowship Program (CPFP) is recommended in order to inform decision-making and identify opportunities to make improvements to or demonstrate the importance of the program to key stakeholders. Although program processes were documented as part of a 2003 site visit, assessment of whether CPFP goals are being met and to what extent have not previously been addressed in a formal evaluation of the CPFP program. Based on the findings of a literature and resource review, as well as a pilot study of CPFP alumni, we recommend that the evaluation employ a combination of measures from existing data sources with additional data collection to supplement areas of career outcomes not addressed by existing sources. Several comparison groups are recommended for evaluation of outcomes that can be obtained from existing datasources. However, additional data collection among individuals from these comparison groups is not recommended.

The full-scale evaluation would address the following questions:

- Are the various program activities, which are designed to administer the CPFP, meeting their intended goal? What are their strengths and/or weaknesses? To what extent are fellows taking advantage of each activity? Does participation affect performance after leaving CPFP? If so, to what extent?
- Are applicant recruitment, applicant selection, track selection and follow-up of program alumni functioning to meet their intended goals?
- To what extent has the CPFP fellowship program met its goal of training researchers and leaders in cancer and cancer prevention research?
- What are the characteristics and demographics of the CPFP program applicants and awardees?
- What are the scientific achievements of the CPFP awardees after finishing the program (i.e. publications, awards, presentations, patents, academic or non-academic positions, etc.)?What are the performance and post-award outcomes of the CPFP awardees?
- How have outcomes changed across time since the CPFP program was introduced? Have outcomes been affected by changes to CPFP, NCI, or NIH budget?
- How do the outcomes for the CPFP participants compare to that of other groups of individuals including unfunded applicants to the CPFP, all eligible doctoral awardees, NCI intramural postdoctoral fellows not involved in CPFP, R25T trainees, and F32 trainees?

In order to provide a context within which these evaluation questions may be addressed, four comparison groups are recommended. While the main study group would consist of CPFP alumni, data from several comparison groups should be used to address various evaluation questions. The study groups would consist of:

1. ***Main study group:*** CPFP alumni/participants who may be identified from the CPFP alumni database;
2. ***Comparison group 1:*** CPFP applicants, included to examine the makeup of the applicant pool, as well as to compare against program participants to assess the performance of CPFP program participants against that of similarly doctoral-trained individuals who may be identified from the CPFP applicant database;
3. ***Comparison group 2:*** Matched cases from eligible doctoral graduates, included to examine the larger potential pool of applicants as well as to compare against program participants to see the

impact of a post-doctoral program versus no specific post-doctoral program across similarly doctoral-trained individuals who may be identified from the NSF SDR/DRF and AAMC Student Data System;

4. ***Comparison group 3:*** Training program participants from R25T programs similar to CPFP; included to examine the impact of the CPFP program in comparison to other similar, structured post-doctoral programs and who may be identified from grant images in NIH IMPACII;
5. and ***Comparison group 4:*** Individuals funded through the F32 mechanism: included to examine the effect of the structured CPFP program compared to the effect of an unstructured post-doctoral program and who may be identified from NIH IMPACII.

Analysis of existing data sources determined that they provided data quality and coverage that are as good as or are an improvement over methods used in the prior literature. Existing data sources recommended for evaluation of outcomes include NIH IMPACII (NIH grants applied for and received), Discovery Logic's ScienceWire (USDA, NSF, DoD grants received), AAMC Faculty Roster (academic position within institutions of medical education), CPFP alumni database (position, current affiliation), Pubmed/MedLine (publications, co-authorship and collaborations, field of research), society membership lists (professional society memberships), and Web of Knowledge (publications, co-authorship and collaborations, field of research, citations, journal impact factor).

However, data obtained from existing data sources will not address the effectiveness of the CPFP program with respect to all outcomes of interest. Additional aspects of the program such as mentorship, creation of leaders in the cancer research and cancer prevention research fields, and participant leveraging of skills and relationships developed during the program may only be addressed through additional data collection.

Among quantitative outcomes, outcomes not addressed by existing databases included consultancies and publication of government reports. It is recommended that these two outcomes be ascertained using additional data collection through an online survey of all CPFP alumni. However, it is not recommended that the quantitative survey be administered to members of comparison groups. The limited number of data elements assessed through this additional data collection in conjunction with the effort and cost of such an assessment outweigh the advantage of having data on comparison groups for these few outcomes.

All qualitative assessments would be conducted through additional data collection as well and would be limited to CPFP alumni. These aspects of the program which will be measured include:

- Perceptions of program curriculum and logistics
- Program conditions, community, group cohesion
- Project evolution
- Concepts and skills in field
- Mentorship, role modeling, relationship-building
- Level of preparation for career
- Confidence
- Career vision and development, intended career path
- Identity
- Perceptions by others
- Satisfaction with CPFP program
- Perceived benefits of the CPFP program
- Recommendations for improvement of the CPFP program

A random sample of approximately 10% of the 186 CPFP alumni (~20 alumni) would be included for the qualitative assessment. As the qualitative instruments are more time-intensive and ask about program components and impact, there would be no comparison study groups included. The recommended format for the qualitative assessment is in-depth, in-person interviews with options for telephone- or web-based

interview depending on the preference of the respondent.

Since data collection is recommended for all CPFP alumni for quantitative outcomes in the form of an online assessment, three qualitative outcomes posing the least burden on respondents would also be included. This would include: satisfaction with, perceived benefits of, and recommendations for improvement of the CPFP program.

Permission for conducting additional data collection will be applied for by the contractor on behalf of CPFP in order to determine the burden of the survey instruments on the respondents and to provide an opportunity for the public to comment of the conduct of the evaluation. In addition, a Privacy Impact Assessment (PIA) would be performed to specifically address the data points collected using the additional quantitative and qualitative assessments.

A summary of the recommendations, their advantages and their limitations can be found in **Table EX1.**

Table EX1. Summary of recommendations for a full-scale evaluation of the CPFP and their corresponding advantages and limitations.

Recommendations	
Advantages	**Limitations**
1. Use existing databases for available quantitative outcomes and include all 5 study groups	
• Automated, consistent and objective ascertainment of outcomes • Low cost • Shorter timeline for completion • Inclusion of comparison groups provides context for interpreting outcomes data • Does not require contacting potential respondents	• Potential for under-ascertainment of available outcomes • Outcomes are limited to those already collected in available databases
2. Perform additional data collection through online survey for quantitative outcomes not ascertained from existing databases (consultancies and authorship on government reports)	
• Online format provides low cost for reminders, circumvents need for data entry • Addition of outcomes not ascertained through existing databases	• Moderate cost • Lower coverage/response rate than ascertainment of outcomes through methods not requiring response from individuals of interest • Longer timelines including application for OMB Clearance and PIA
3. Limit additional data collection for quantitative outcomes to CPFP alumni, of whom all will be included	
• Minimizes costs for data collection • Includes all CPFP alumni	• Does not include any comparison groups and therefore limited context for interpreting outcomes
4. Include a limited selection of qualitative outcomes in online survey	
• Increases coverage for select qualitative outcomes • No additional cost over that for collection or quantitative outcomes • Minimal additional time required for OMB and PIA	• Increased respondent burden • May result in lower response or completion rates
5. Perform additional data collection including all qualitative outcomes through in-depth interviews for a sample of CPFP alumni	
• Sample (rather than inclusion of all CPFP alumni) minimizes cost • Adds outcomes not ascertained from other data sources and other data collection	• High cost of data collection and analysis in comparison to collection of additional quantitative outcomes and to use of existing databases • Does not include any comparison groups • Longer timeline including application for OMB Clearance and PIA

The findings of the feasibility evaluation support the need for and feasibility of a full-scale evaluation of the National Cancer Institute's Cancer Prevention Fellowship Program. The methods and products of such an evaluation would not only serve to inform CPFP program administrators, but may serve to inform training programs beyond those at NCI as well as the evaluation community in general.

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I. CPFP Full-Scale Evaluation Goals

The NCI Cancer Prevention Fellowship Program (CPFP) was introduced in 1987 as an intramural training program to provide training for postdoctoral fellows in cancer prevention. The main goal of the program is to train individuals from a multiplicity of health sciences disciplines in the field of cancer prevention and control. The CPFP aims to provide a strong foundation for scientists and clinicians to train in the field of cancer prevention and control. CPFP offers training toward an MPH degree at an accredited university during the first year, followed by mentored research with investigators at the NCI.

Discovery Logic, a Thomson Reuters company, had been contracted by the National Cancer Institute (NCI), Center for Cancer Training (CCT), for a feasibility study of a quantitative and qualitative process and outcome evaluation of the NCI CPFP.

Objectives for this feasibility study included conducting a comprehensive literature review of outcome evaluation research, assess the feasibility of evaluating the CPFP; and then to develop the design for an outcome evaluation of the NCI CPFP. In addition to focusing on metrics for program goals and trainee accomplishments, the study included a review and recommendations for process evaluation measures. The questions addressed in the feasibility study included:

- What is the most appropriate evaluation design for evaluating the NCI CPFP training program?
- What are the appropriate outcomes of interest, and what performance measures are appropriate?
- What data can be collected using existing resources, and what data might require new collection efforts?
- How will data be collected?
- What clearance requirements might be necessary?

II. Justification for a Full-Scale Evaluation

Information resulting from well-planned evaluations completed prior to decision-making may determine whether a program continues, if not in whole then in what parts, how it may be adapted or expanded, or how changes that have already been made to a program have affected outcomes. When programs are not evaluated, opportunities may be missed to make improvements or to demonstrate the importance of the program to key stakeholders, or sub-optimal program efforts may be continued while truly successful ones may be discontinued due to a lack of evidence.

A 2008 outcomes evaluation of the NIH extramural Loan Repayment Program (LRP) was performed to determine whether LRP awards are effective in their broad purpose of recruiting and retaining qualified researchers in health-related research careers, and to evaluate participant progress in becoming independent biomedical researchers. The evaluation found that the target population received significant benefit from program participation in terms of subsequent NIH grant application and award activity. It also found that specific sub-populations of awardees accrued these benefits at a lower rate than the overall awardee group. The NIH has been able to use the study findings to explore policy options for program improvements.

The NIH Office of Extramural Research performed an evaluation of the number of individuals supported on NIH research awards. The data have proven to be a rich resource for NIH workforce analyses, including examining the number of personnel engaged in work on more than one grant, role and age distributions,

and differences in personnel by grant mechanism. This evaluation also highlighted deficiencies in data collection, and informed decisions to update the key personnel component of NIH progress reports (Form 2490) and associated guidance to principal investigators and institutions.

These previous studies show that data and evaluation methodologies have proven to be useful in informing NIH program staff regarding whether and how any program alignments are called for. A full-scale outcome evaluation of the CPFP program would provide information needed for administrators to focus on how to improve program functionality. In addition, such a study may help to refine program recruitment, adjust or define new program components, inform current and former fellows, and serve as a resource for administrators of similar fellowship programs.

The feasibility evaluation highlighted opportunities and methodologies to inform CPFP program processes and use of resources through a full-scale outcomes evaluation. Although program processes were documented as part of a 2003 site visit, assessment of whether CPFP goals are being met and to what extent have not previously been addressed in a formal evaluation of the CPFP program. To determine whether a full-scale evaluation is possible and necessary, the feasibility study framed a set of questions to be addressed and analyzed existing data sources to determine which outcomes may be analyzed in a cost effective manner without the need for additional data collection, finding that these data sources provided data quality and coverage that was as good as or was an improvement over methods used in the prior literature. However, data obtained from existing data sources could only address the effectiveness of the CPFP program to a limited degree. Additional aspects of the program such as mentorship and participant leveraging of skills and relationships developed during the program would only be addressed through additional data collection.

These findings supported the need for and feasibility of a full-scale evaluation of the National Cancer Institute's Cancer Prevention Fellowship Program. The methods and products of such an evaluation would not only serve to inform CPFP program administrators, but may serve to inform training programs beyond those at NCI as well as the evaluation community in general.

III. Literature and Resource Review

A literature search was performed examining peer-reviewed publications, working papers, and non-scholarly literature addressing evaluations of training programs similar to the CPFP. Relevant sources were defined as those that provided information on at least one of the following areas:

I. Methods for obtaining follow-up information for alumni of a program for the purpose of evaluating career outcomes
II. Measures of career outcomes or programmatic process measures relevant to CPFP participants
III. Evaluations of program goal attainment for career development programs such as fellowships, internships, or other educational interventions or programs as they relate to career outcomes regardless of field of interest

Searches were conducted in Web of Knowledge which contains peer-reviewed publications from journals in science, medicine, and engineering (Web of Science, Current Contents Connect, BIOSIS Previews, Inspec, MedLine), business, social science, humanities, and arts (Web of Science, Current Contents Connect); as well as other sources (Derwent Innovations Index, Food Science and Technology Abstracts, Zoological Record). Particular attention was paid to literature from the Business Collection (contained within Current

Contents Connect). Due to particular interest in the area, an additional search was conducted to examine qualitative approaches used in program evaluations.

Three hundred and fifty-nine publications were identified from the search, of which 22 (8.5%) were relevant. Several reports with quantitative evaluations of outcomes employed the use of external databases either for the evaluation of participant outcomes or to identify individuals to be included as a comparison group. The outcomes evaluated through these databases included those related to research funding and publications. However, the majority of career outcomes were measured using self-reported data from participant surveys (**Table 1**).

Table 1. Description of measures used in the evaluation literature and their sources.

Measure	Source	
Process	**Database**	**Other**
Satisfaction with program	--	Participant survey
Applications, awards, presentations during program	--	Participant survey
Experiences during program	--	Participant survey
Participation in program components	--	Participant survey
Timeliness of receipt of funding (extramural programs)	--	Participant survey
Quality of participant work while in program	--	Adviser survey
Outcomes		
Academic position	AAMC Faculty Roster System	Participant survey CVs
Subsequent postdoctoral awards	NIH Trainee and Fellow File	--
Publications	Web of Knowledge/ISI PubMed	Participant survey
Funding/Grants	NIH IMPACII, electronic databases NSF database of awards	Participant survey
Awards	--	Participant survey
Membership in National Academies	National Academies database	--
Time devoted to clinic vs. academic practice, clinic vs. basic research, teaching, administrative duties	--	Participant survey
Relationship between training institution and current institution	--	Participant survey
Time to tenure	--	CVs
Institutional service	--	Participant survey
Career choice/Career plans	--	Participant survey
Retention in research field	--	Participant survey
Degree completion	--	Participant survey
Current employment	--	Participant survey

An additional 9 evaluations used focus groups or individuals interviews among program participants to identify ways in which the programs affected career choices or career outcomes. These evaluations also addressed aspects of the program process such as participant satisfaction and experiences during the time of the program.

Response rates, though not commonly reported, ranged between 38-100% for quantitative evaluations, where 100% response was obtained in a small evaluation conducted for a program with 66 alumni. In

comparison to health surveys which typically obtain response rates of about 30%, these rates are relatively high. However, this is to be expected where participants are responding to a survey regarding a program in which they have already made a personal investment. Limited information was obtained regarding methods to increase response rates.

Only 9 of 17 evaluations included true comparison groups. Several more studies also used comparison groups to evaluate demographic characteristics. For the purposes of this review, however, groups for which only demographic characteristics were compared to program participants were not considered as a true comparison group since no evaluation of career outcomes was performed for these individuals. The major challenge facing any evaluation is the availability of information about, and the resources required to obtain the same breadth and quality of data for a comparison group compared to program participants. Although comparison groups seemed to be identified prior to the data collection activities required for evaluation, few evaluations directly contacted members of comparison groups to administered surveys, limiting information for comparison groups to that available from existing databases. For those evaluations where no comparison group was used, no justifications were given for the lack of comparison.

Overall, limited information was reported regarding response rate and methods to increase response rates. In addition, career outcomes are largely self-reported. Evaluations often did not have a comparison group and provided little justification for this lack of inclusion. Even among evaluations with comparison groups, authors concede that each group has issues of comparability or appropriateness.

IV. Recommended Evaluation Design

Based on the findings of the literature and resource review, as well as the pilot study of CPFP alumni conducted as part of Task 5 of the feasibility evaluation, we recommend that the full-scale evaluation employ a combination of data from existing data sources with additional data collection to supplement areas of career outcomes not addressed by existing sources. Details of the pilot study may be found in Appendix 2: Findings from the Pilot Study.

a. Key Evaluation Questions

The key evaluation questions to be addressed by the full-scale evaluation are:

- Are the various program activities, which are designed to administer the CPFP, meeting their intended goal? What are their strengths and/or weaknesses? To what extent are fellows taking advantage of each activity? Does participation affect performance after leaving CPFP? If so, to what extent?
- Are applicant recruitment, applicant selection, track selection and follow-up of program alumni functioning to meet their intended goals?
- To what extent has the CPFP fellowship program met its goal of training researchers and leaders in cancer and cancer prevention research?
- What are the characteristics and demographics of the CPFP program applicants and awardees?
- What are the scientific achievements of the CPFP awardees after finishing the program (i.e. publications, awards, presentations, patents, academic or non-academic positions, etc.)?What are the performance and post-award outcomes of the CPFP awardees?

- How have outcomes changed across time since the CPFP program was introduced? Have outcomes been affected by changes to CPFP, NCI, or NIH budget?
- How do the outcomes for the CPFP participants compare to that of other groups of individuals including unfunded applicants to the CPFP, all eligible doctoral awardees, NCI intramural postdoctoral fellows not involved in CPFP, R25T trainees, and F32 trainees?

b. Target Population

While the main study group would consist of CPFP alumni, data from several comparison groups should be used to address various evaluation questions. Individuals from these comparison groups may be identified from various sources (**Table 2**). The study groups would consist of:

1. ***Main study group:*** CPFP alumni/participants;
2. ***Comparison group 1:*** CPFP applicants, included to examine the makeup of the applicant pool, as well as to compare against program participants to assess the performance of CPFP program participants against that of similarly doctoral-trained individuals;
3. ***Comparison group 2:*** Matched cases from eligible doctoral graduates, included to examine the larger potential pool of applicants as well as to compare against program participants to see the impact of a post-doctoral program versus no specific post-doctoral program across similarly doctoral-trained individuals;
4. ***Comparison group 3:*** Training program participants from R25T programs similar to CPFP; included to examine the impact of the CPFP program in comparison to other similar, structured post-doctoral programs;
5. and ***Comparison group 4:*** Individuals funded through the F32 mechanism: included to examine the effect of the structured CPFP program compared to the effect of an unstructured post-doctoral program.

Individuals within each comparison group would be identified from the data sources described in **Table 2**.

c. Key Variables and Performance Measures

All outcome variables required to address the evaluation questions are listed in **Table 3** and should be measured among all CPFP fellows and all comparison groups using existing data sources where available and among CPFP fellows using additional data collection where data are not available.

d. Conceptual Framework

The conceptual framework for the full-scale evaluation is described in **Figure 1.** Conceptual framework for full-scale evaluation. It is hypothesized that career outcomes of individuals (**Box 1**) are affected by both individual-level characteristics unrelated to having been a participant in the CPFP program (**Box 2**) as well as individual-level characteristics related to the CPFP program (**Box 3**). In turn, program level changes (**Box 4**) may potentially affect career outcomes through its effect on program-related characteristics (**Box 3**). In addition, external factors (**Box 5**) may influence career outcomes either indirectly by causing program-level changes (**Box 4**) or directly through their effects on career outcomes themselves (**Box 5**). The specific examples of each type of factor and outcome, shown in bullets within each box, are not exhaustive and may be used in the analysis in different ways.

The potential effects of external factors (**Box 5**) are not of interest at this time and will be accounted for in time-, field-, and institution-based matching of participants to individuals in potential comparison groups. These factors may include changes in NIH funding; secular trends in publication output, citations, and

journal or publication impact.

In conjunction with the evaluation questions, this framework will be used to guide the analysis for a full-scale evaluation.

Table 2. Available data sources, their fields, and recommended use for a full-scale evaluation.

Database	Target study group	Data availability	N	Available fields	Use of field	Year available/ used	Individuals to be included
Study group databases							
CPFP Applicant database*	CPFP applicants and alumni	Available	2,015	Name Contact information†	Link to existing external databases	1987-2011	All ǂ
				CV (dated from time of application) Personal statement Previous degrees Previous institutions Application score Interview scores Stipend offer	Individual-level predictor		
				Application status Interview status Invitation status	Study group identifier		
CPFP Alumni database	CPFP alumni	Available	184	Name Contact information	Link to existing external databases	1987-2010	All
				Year of entry and exit	Individual-level predictor		
				Current position	Outcome evaluation		
				Preceptor	Process evaluation		
AAMC Student Data System (FACTS) ‡	Non-applicant MDs	Unclear	Unclear	Name	Link to existing external databases	1987-2011	Sampled, matched to CPFP alumni institution and year
				Institution Year of degree	Matching variable		
				Demographics	Individual-level predictor, Matching variable		
NSF SDR ††	Non-applicant PhDs in relevant fields	Available	5,600-9,900 / year	Name	Link to existing external databases	1987-2011	Sampled, matched to CPFP alumni institution, field of
				Field of study Institution Year of degree	Matching variable		
				Demographics	Individual-level		

					predictor, Matching variable		study and year
R25T Program participants**	Alumni of another postdoctoral programs similar to CPFP	Available from R25T renewal applications	~62	Name	Link to existing external databases	Various times from 1993-2007	Matched to CPFP alumni year
				Year of entry	Matching variable		
				Previous degrees Previous institutions Research topic Mentor Demographics	Individual-level predictor		
				Current institution Current position	Outcome evaluation		
F32 grantees	Un-structured post-doctoral research program	Available (IMPACII)	1,337	Name Contact information	Link to existing external databases	1987-2007	Matched to CPFP alumni year
				Year of grant	Matching variable		

Notes:
* Not all information is available for all individuals, particularly those who applied prior to 2002
† Email address, work/mailing address, and/or telephone
ǂ Where feasible, all CPFP applicants will be included in outcome evaluations and comparisons. However, for ascertainment of more labor-intensive outcomes, a sample of applicants may be taken.
** Availability of information differs by R25T program. Sorensen (R25CA057711, 1993-2002, number of named postdoctoral trainees=33), Heimburger (R25CA047888, 2000-2007, N= 10), Chamberlain: (R25CA057711, R25CA056452, 1998-2006, N=19). Date of 'current position' and 'current institution' may differ by program or be unclear. No grant images could be located for Weissfield (R25CA057703).
†† Numbers shown for relevant fields of study (defined based on description of eligible applicants from 2003 site visit)

Table 3. Availability of evaluation measures in existing internal and external data sources.

Measure	Existing Internal Datasources			Existing External Data Sources				
	Applicant Db	Annual Reports	Alumni Db	IMPACII	Science-Wire	PubMed / Web of Knowledge	AAMC Faculty Roster	Society Membership Lists
Individual/Background Characteristics								
Demographic information	✓		✓					
Previous degrees and education	✓		✓					
Previous research field, experience	✓		✓					
Application score	✓							
Interview score	✓							
Program-Related Measures								
Preceptor Name		✓	✓					
Preceptor characteristics		✓	✓					
Received MPH as part of CPFP		✓						
CPFP-specific MPH degree-granting institution		✓						
Participation in CPFP program components		✓						
Publications during program		✓						
Quantitative Outcome Measures								
Academic position			✓				✓	
Current employment and sector			✓				✓	
Current position			✓				✓	
Membership or service to professional societies								✓
Consultancies								
NIH and NCI funding (receipt, timing, amount)				✓	✓			
Other external funding (DoD, NSF, USDA, etc.)					✓			
Publications						✓		
Journal Impact Factor						✓		
Patents					✓			
Area of activity within cancer research, cancer prevention research				✓	✓	✓		
Collaboration in cancer prevention research, cancer prevention research						✓		
Authorship on government report, or guidelines								
Publication referenced on government report or guidelines								
Qualitative Outcome Measures								
Perceptions of program curriculum, logistics								
Program conditions, community, group cohesion								
Project evolution								
Concepts and skills in field								
Mentorship, role modeling, relationship-building								
Level of preparation for career								
Confidence								

Career vision and development, intended career path
Identity
Perceptions by others
Satisfaction with CPFP program
Perceived benefits of CPFP program
Recommendations for improvement of CPFP program
Characteristics of Proposed Data Collection Strategies
Currently Available
Frequency of data collection
Relative Cost

Figure 1. Conceptual framework for full-scale evaluation

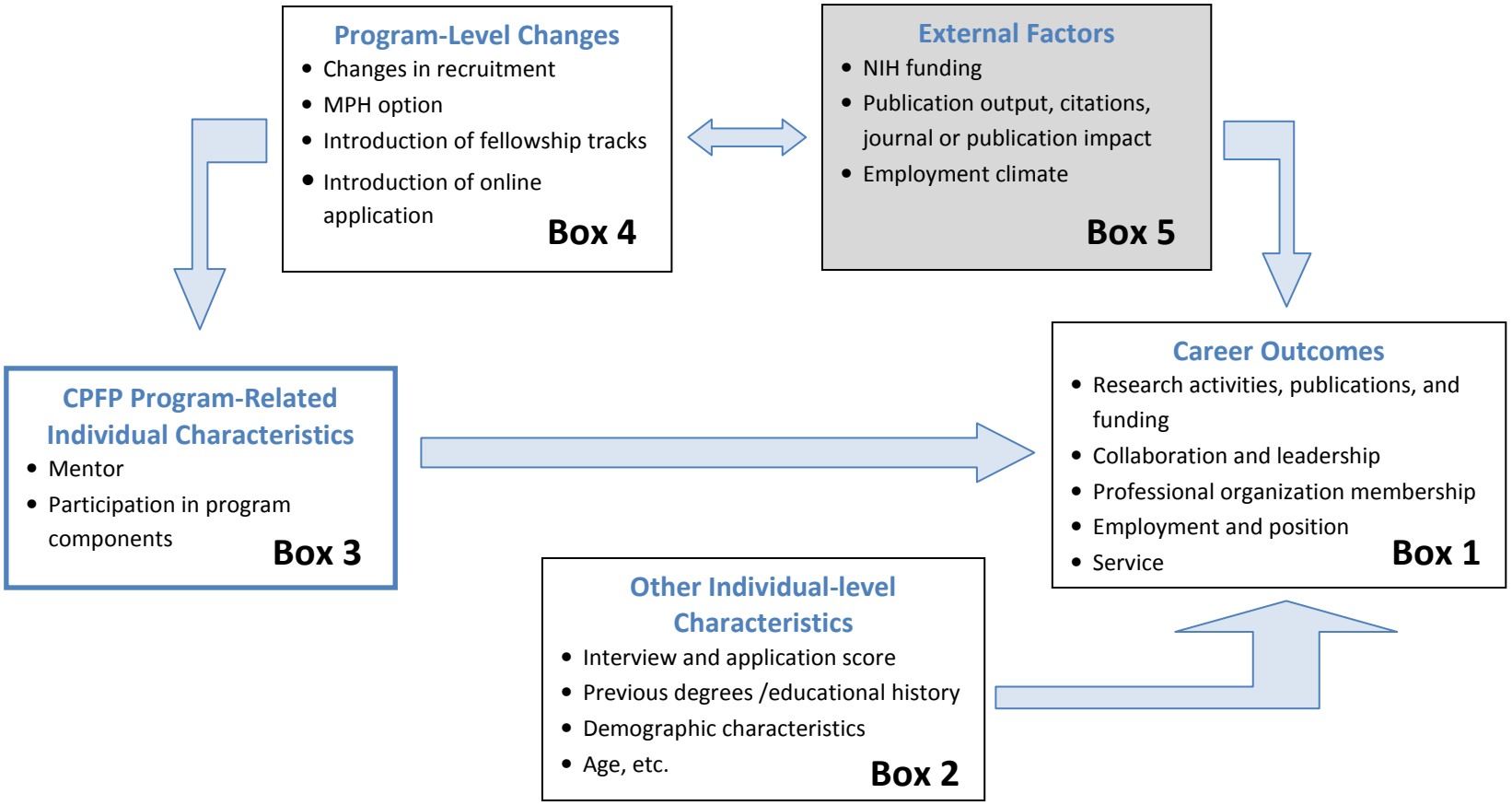

Table 4. Description of fields available from internal sources and their uses in a full-scale evaluation.

Database	Target study group(s)	N	Available fields	Use of field	Year available/ used	Individuals to be included
Study group databases						
CPFP Applicant database	CPFP applicants and alumni	2,015	Name Contact information†	Link to existing external databases	1987-2011	All/Sample
			CV (dated from time of application) Personal statement Previous degrees Previous institutions Application score Interview scores Stipend offer	Individual-level predictor		
			Application status Interview status Invitation status	Study group identifier		
CPFP Alumni database	CPFP alumni	184	Name Contact information	Link to existing external databases	1987-2010	All
			Year of entry and exit	Individual-level predictor		
			Current position and employer	Outcome evaluation		
			Preceptor	Process evaluation		
CPFP Participants Annual Progress Reports	CPFP Participants	184	Name	Link to existing external databases	1987-2010	All
			Participation in program components	Process evaluation		

All data sources are available for use as of January 18th, 2011.

Table 5. Description of information available from external databases and their use in a full-scale evaluation.

Database	Target study group(s)	Data availability	Available fields	Use of field	Year available/ To be used
NIH IMPACII	All	Available	Principal Investigator Name Contact information	Link to study group databases	1990-2010
			Grants applied for and awarded Funded amount Fiscal year Research Topics (awarded)	Outcome evaluation	
PubMed/MedLine	All	Available	Author Name Contact information	Link to study group databases	1990-2010
			Publication citation information MeSH Terms	Outcome evaluation	
ScienceWire[1]	All	Available	Principal Investigator Name	Link to study group databases	1990-2010
			Contact information		
			Grants applied for within NSF, USDA, DoD	Outcome Evaluation	
			Funded amount		
			Fiscal year		
			Research topic		
International Cancer Research Portfolio[2]	All	Available	Principal Investigator Name Contact Information	Link to study group databases	1990-2010
			Grants awarded Fiscal Year Research topic	Outcome Evaluation	
US Patent and Trade Office database	All	Available	Inventor Name Assignee (Institution) Patents applied for and granted Year	Link to study group databases Outcome evaluation	1990-2010
Web of Knowledge (requires subscription which NIH has as of 1/18/2011)	All	Available	Author Name Contact information	Link to study group databases	1990-2010
			Publication information Author Keywords Keywords Plus Journal impact factor Number of citations	Outcome evaluation	
AAMC Faculty Roster (FAMOUS)	All	Available through NIH	Name Contact information	Link to study group databases	Current
			Academic position Employment history	Outcome evaluation	

Notes:

1. ScienceWire is Discovery Logic's proprietary database containing grant information compiled across multiple agencies including the National Science Foundation, the US Department of Agriculture, the Department of Defense, the Department of Energy, etc.
2. The International Cancer Research Portfolio (www.cancerportfolio.com) includes information on grants awarded by a variety of funders in the United States as well as the United Kingdom: The UK National Cancer Research Institute, the US National Cancer Institute, US Congressionally-Directed Medical Research Programs (DOD, CDMRP), American Cancer Society, California Breast Cancer Research Program, Canadian Cancer Research Alliance, Oncology Nursing Society Foundation, Prostate Cancer Foundation and Susan G. Komen Breast Cancer Foundation.

Table 6. Description of information available from professional organization membership lists and their use in a full-scale evaluation, listed in order of priority.

Association	Target study group	Data availability	Available fields	Use of field
American Public Health Association (APHA)	All	Available with membership		
	https://secure.apha.org/Source/Security/Member-Logon.cfm?section=Login&where_to_next_source=http%3a%2f%2fwww.apha.org%2fabout%2fmembership%2fdirectory%2fdefault.htm			
American Society of Preventive Oncology (ASPO)	All	Available with membership		
	http://www.aspo.org/members_area			
American Association of Cancer Researchers (AACR)	All	Available with membership	Name Contact information	Link to study group databases
			Membership Area of research Country	Outcome evaluation
	http://www.aacr.org/home/membership-/membership-directory.aspx			
Society for Epidemiologic Research (SER)	All	Available with membership		
	http://www.epiresearch.org/members/index2.php			
Society of Behavioral Medicine (SBM)	All or Cancer Special Interest Group (SIG)	Available with membership		
	https://sbm.execinc.com/edibo/Login?ReturnURL=/edibo/MemberDirectory/SP_Default&CriteriaError=1&LoginMessage=You+must+be+a+member+or+staff+member+to+view+this+page.			
American Society of Clinical Oncology (ASCO)	All	Available with membership		
	http://www.asco.org/ASCOv2/MyASCO/Membership+Directory?intcmp=membdir-signin			
American College of Preventive Medicine (ACPM)	All physicians			
	Membership directory does not seem to be available on the web			
	http://www.atpm.org/membership/members.html			

V. Data Collection and Analysis

a. Existing Data Sources

A pilot study was conducted using a sample of 10 former CPFP fellows to characterize all existing, internal and external data sources and their potential use in a full-scale evaluation. Based on those findings, recommended internal sources to be used for the full-scale evaluation along with the data elements contained in them are described in **Table 4**. Recommended existing external data sources (other than professional society membership lists) are presented in **Table 5**. Recommended society membership lists are presented in **Table 6**.

b. Additional Data Collection Strategies

In order to address the evaluation questions which could not be evaluated using data from existing databases, additional data collection in the form of an online survey for quantitative measures and an in-depth interview for qualitative measures is recommended.

The evaluation measures to be addressed, as well as potential forms of the survey questions are presented in **Table 7** for quantitative measures, and **Table 8** for qualitative measures.

Table 7. Sample survey questions for a quantitative survey instrument.

Measure	Existing program assessment question	Newly developed questions
Consultancies	[Did you have] any consulting contracts? 01 YES 02 NO 98 DK 99 REFUSED	Have you had any cancer research related consulting contracts? How many?
Authorship on government report, or guidelines	Within the government sector, do you (did you) primarily work at…. [INTERVIEWER NOTE: Please read list] 01 a Foreign government 02 the U.S. Federal government (i.e., civil service) 03 the U.S. Military 04 a State government 05 a County or Municipal government 98 DON'T KNOW 99 REFUSED	Have you been an author on any U.S. federal government reports or guidelines? If so, on how many reports? Which reports?

Existing program assessment questions are taken directly from the stated sources or, where appropriate, newly written to meet the needs of the proposed evaluation.
Source: Assessment of NIH Minority Research and Training Programs: Phase 3.

Quantitative Measures. All former CPFP fellows will be included in the quantitative survey. However, it is not recommended that the quantitative survey be administered to members of comparison groups. Although one or more comparison groups could be included for the full-scale evaluation overall, the limited number of data elements assessed through additional data collection in conjunction with the effort and cost of such an assessment outweigh the advantage of having data on comparison groups for these outcomes.

The recommended format for this assessment is an online survey. The advantages of this format lie in that data may be collected for all respondents using this method providing uniform data collection, low cost of dissemination, low cost for the dissemination of reminders, and the elimination of manual data entry of completed surveys. In addition, information may be obtained regarding the number of survey respondents

who initiated the survey but who did not complete and submit the survey. Challenges include obtaining an email address for each respondent, as well as potential lack of familiarity with online surveys for some alumni. Email addresses are available for CPFP alumni, but are not readily available for other comparison groups. Response rates for an online survey are expected to be similar to those found in the evaluations identified in the literature review, about 50 to 75%.

Other methods for data collection, including mailed surveys and remote web interviews were considered. However, the recommended methods provide the best combination of high data quality, low participant burden and low cost.

Qualitative Measures. A random sample of approximately 10% of the 186 CPFP alumni (~20 alumni) would be included for the qualitative assessment. As the qualitative survey instruments are more time-intensive and ask about program components and impact, there would be no comparison study groups included.

The recommended format for the qualitative assessment is in-depth, in-person interviews. The advantages of this format include the ability to address qualitative aspects of the evaluation and collect detailed response data with less participant burden than other methods such as mailed survey or online survey. Disadvantages include a greater participant burden for response to such in-depth assessments in comparison to quantitative assessments, a smaller sample size necessitated by the format, and greater cost of data collection and analysis. As an alternative, particularly for alumni who may be sampled and who do not reside in the metropolitan DC area, a telephone- or web-based interview using a web camera may instead be conducted with similar advantages and disadvantages as an in-person interview. A focus group session is not recommended. Although the amount of time required for data collection would be less than that required for in-depth interviews for the same number of CPFP alumni, it is likely to be difficult to schedule one time for multiple CPFP alumni to participate in one location given the limited availability of these individuals.

Survey Development. For survey development, the majority of effort should focus on the qualitative assessment. The steps required in the development of the qualitative instrument for the full-scale evaluation are described below:

Survey Question Development

1. Create preliminary question list for focus group sessions and in-depth, in-person interviews. Pilot survey sessions will be approximately 120 minutes in duration. Common key themes and examples of these themes will be identified from the data.
2. Review of preliminary question list by CPFP.
3. Pilot survey with 5 people in person (does not require OMB clearance).
4. Update preliminary question list based on pilot. Final session will be approximately 90 minutes of survey time.
5. Review of question list by CPFP.
6. Finalize question list.
7. Obtain OMB clearance.

Survey Format Development

1. Create survey script and instructions for in-person interview.

Contacts

1. Randomly select participants for survey. A stratified sample may be taken based on geography (DC metro/east coast), or response to quantitative survey. Obtain phone numbers, and email addresses of sampled alumni.

Survey Distribution

1. Surveys will be conducted by evaluation personnel either on-site at NCI, at the contractor's site, or at a place of the respondents' choosing. Depending on geography, web- or telephone-based interview may be conducted in lieu of an in-person interview.

Data Collection

1. Responses will be audio recorded.

Data Entry

1. Interview recordings will be transcribed.

Since data collection is recommended for all CPFP alumni for quantitative outcomes in the form of an online assessment, three qualitative outcomes posing the least burden on respondents would also be included. This would include: satisfaction with, perceived benefits of, and recommendations for improvement of the CPFP program.

c. Data Integrity and Preparation

Data from quantitative survey instrument will be stored in a secure location. Qualitative assessment will be recorded and transcribed and both forms of the data will be stored in a secure location. Salient themes will be extracted for analysis, and summary excerpts will be noted.

Data from the CPFP applicant database must be extracted from the database that serves as the source files for the CPFP applicant evaluation website prior to use as an evaluation data source. Data must then be cleaned and examined for duplicate entries (instances where an individual has multiple records either because of duplicate entries in the same year or multiple applications in multiple years).

Annual reports from CPFP participants must be retrieved, manually reviewed, and key variables recorded in a database. This may be done in several ways: a) extracting data into a structured database, b) manual entry it into a database, or c) building a database and an application for collecting the data through a web interface.

Data from the CPFP alumni database can largely be used as is. However, some data will need to be categorized (i.e., current employment setting or position).

For existing external databases, matching of individuals identified either from the CPFP databases or from comparison groups to the database would be performed based on name and contact information, as described in **Table 3**. With two exceptions (ICRP and AAMC Faculty Roster), data sources in **Table 5** are currently ready for use. Available in-house at Discovery Logic, the Web of Knowledge database requires a subscription through Thomson Reuters, which NIH holds current as of January 2011. In addition, the U.S. Government Printing Office Federal Digital System and the National Library of Medicine Health Services/Technology Assessment Text are available online but require manual search. Data sources in

Table 8. Suggestions for survey questions for the qualitative survey instrument.

Measure	Existing program assessment questions	Newly developed questions
Perceptions of program curriculum, logistics	What parts of the curriculum have been most valuable to you? Could you please provide some examples?	What three aspects of the CPFP program curriculum did you find the most useful while in the program? What three aspects of the CPFP program curriculum did you find the most useful looking back at the program?
Program conditions, community, group cohesion	Tell me about the environment of the fellowship. What general comments and reflections do you have on the overall experience of the fellowship? To what extent did the fellowship foster your participation in a community of cancer or cancer prevention researchers? What was the experience of the fellowship like for you?	
Project evolution	Has your fellowship project evolved since the fellowship and, if so, how?	Did you feel the research project you were involved with was challenging and meaningful?
Concepts and skills in field	How did the fellowship foster the development of skills required in cancer research?	Can you tell me how or in what ways the CPFP program build your understanding of concepts and skills in the field?
Mentorship, role modeling, relationship-building	Tell me about relationships in the fellowship.	How did your experience with your primary research preceptor affect you during the CPFP program? How did it affect your career after your completed the program? Among the CPFP staff, what individuals other than primary research preceptor served as served mentors to you during your time in the program? How did your experience with these mentors affect you during the program? How these experiences affect your career after the program?
Level of preparation for career	Did participation in the program prepare you for a career as an independent investigator in general? In cancer or cancer prevention research? What part of the fellowship experience had the biggest effect on you in terms of preparation for that role?	During your time in the CPFP program, what were the three most useful career development tools you obtained from being in the program?
Confidence	How has the fellowship affected your sense of confidence in your effectiveness as an independent investigator? As an investigator in cancer or cancer prevention research?	
Career vision and development, intended career path	Did the fellowship make you rethink your academic career? If so, how? What has happened to your career in the last 2 years?	Are you currently in the career path you expected to be in when you completed the CPFP program?
Identity	To what extent would you say that the fellowship has affected your sense of identity as a cancer researcher? How has the fellowship affected your sense of yourself as a change agent or a leader in cancer research?	
Perceptions by others	How do you feel it prepared you differently from investigators who did not participate in an educational program like the fellowship?	How do you feel the program is perceived by other researcher in your field?

Satisfaction with CPFP program		How satisfied are you with the CPFP program?
Perceived benefits of CPFP program	What opportunities presented themselves to you, merely because of completing the fellowship? What have you accomplished that you would not have been able to do without this fellowship training? In your opinion, what has been the greatest impact of the fellowship so far?	
Recommendations for improvement of CPFP program	Looking back now, in what ways might you have changed the fellowship experience? What recommendations about the fellowship do you have for us as we develop the plan for future years?	

Table 6 may require manual review of websites, or cooperation with the professional organization that manages the membership list.

d. Data Analysis

Methods used to analyze the data for the pilot study conducted as part of the feasibility evaluation (Task 5) would be applied for the full-scale evaluation. This would include statistics of quantitative outcomes described in **Table 3** using tests for equality of means or equality of proportions across groups as appropriate. Data may be disaggregated by year to present a longitudinal view of characteristics of CPFP class cohorts and comparison groups. Data coverage and availability may limit reporting of some outcome and process measures across groups. For qualitative outcomes resulting from additional data collection, a list of important themes would be generated, conceptually organized and categories will be examined for completeness, congruence, and coherence.

e. Data Limitations

The main data limitation for quantitative outcomes will be in incomplete ascertainment of outcomes. In order to insure that outcomes linked to an individual are truly those pertaining to that individual, the name-matching algorithm used to link individuals to outcomes should require a high level of confidence. This may, however, result in some true outcomes not being linked to an individual because of uncertainty stemming from limited information regarding a particular outcome. For example, an individual with a common name may appear to have many publications simply because his/her name is common. In order to distinguish between the individual of interest and all others sharing the same name only publications with an email address known to be linked to this individual may be listed as publications for this individual. While this will insure that all publications linked to this individual are truly his/hers, it may result in some publications being missed.

For additional data obtained from qualitative evaluations, the greatest challenge will be in eliciting responses from an adequate proportion of the CPFP alumni. Based on results of the feasibility evaluation, it appears that these individuals are in positions of responsibility which may limit their availability to participate in a time-intensive, qualitative evaluation. This would limit the generalizability of findings, but may be overcome by limiting the number of questions and duration of time spent on each question.

f. Ethical Considerations

In order to ensure data security, individuals working for the contractor will have obtained proper security clearances and will be required to adhere to strict professional survey standards and sign a non-disclosure agreement as a condition of their employment. Web-based and any hard copy data collection forms should be maintained in a secure area for receipt and processing. All data files on multi-user systems should be under the control of a database manager and should be subject to controlled access only by authorized personnel. Individual identifying information should be maintained separately from completed data collection forms, and from computerized data files used for analysis. Annual and Final Reports should be summary reports in which individuals are not identified.

As part of the full-scale evaluation, a Privacy Impact Assessment (PIA) must be performed and would be developed by the contractor in collaboration with CPFP prior to creating the package for OMB clearance. Assessments would include evaluation of personally identifying information in web-based and hard copy data collection forms for additional data collection, security of the physical and/or electronic locations where data from additional data collection and existing databases would be stored, and methods of use

and sharing of collected information with respect to protecting the identity of survey respondents, former CPFP fellows, and members of comparison groups. The PIA will specifically address the data points collected using the additional quantitative and qualitative assessments developed as a result of the pilot studies described in Task 6, as well as the data to be retrieved from existing data sources. An estimated duration of 2 months will be allotted for this task.

In addition, clearance from the Office of Management and Budget will be obtained prior to conducting the study, providing an assessment of respondent burden and an opportunity for the public to provide feedback.

A summary of recommendations, their advantages and their limitations is provided in **Table 9**.

Table 9. Summary of recommendations for a full-scale evaluation of the CPFP and their corresponding advantages and limitations.

Recommendations	
Advantages	**Limitations**
1. Use existing databases for available quantitative outcomes and include all 5 study groups	
• Automated, consistent and objective ascertainment of outcomes • Low cost • Shorter timeline for completion • Inclusion of comparison groups provides context for interpreting outcomes data • Does not require contacting potential respondents	• Potential for under-ascertainment of available outcomes • Outcomes are limited to those already collected in available databases
2. Perform additional data collection through online survey for quantitative outcomes not ascertained from existing databases (consultancies and authorship on government reports)	
• Online format provides low cost for reminders, circumvents need for data entry • Addition of outcomes not ascertained through existing databases	• Moderate cost • Lower coverage/response rate than ascertainment of outcomes through methods not requiring response from individuals of interest • Longer timelines including application for OMB Clearance and PIA
3. Limit additional data collection for quantitative outcomes to CPFP alumni, of whom all will be included	
• Minimizes costs for data collection • Includes all CPFP alumni	• Does not include any comparison groups and therefore limited context for interpreting outcomes
4. Include a limited selection of qualitative outcomes in online survey	
• Increases coverage for select qualitative outcomes • No additional cost over that for collection or quantitative outcomes • Minimal additional time required for OMB and PIA	• Increased respondent burden • May result in lower response or completion rates
5. Perform additional data collection including all qualitative outcomes through in-depth interviews for a sample of CPFP alumni	
• Sample (rather than inclusion of all CPFP alumni) minimizes cost • Adds outcomes not ascertained from other data sources and other data collection	• High cost of data collection and analysis in comparison to collection of additional quantitative outcomes and to use of existing databases • Does not include any comparison groups • Longer timeline including application for OMB Clearance and PIA

VI. Evaluation of Results

a. Products of the Evaluation and Interpretation

A final written report and slide deck summarizing study findings should be provided to program administrators as part of the full-scale evaluation. We recommend the report and slides be available as online resources, as these may be disseminated in a cost-effective manner and may be adapted for print resources to support recruitment, program documentation, and reporting activities relevant to administrators.

The results of, along with additional analysis of the results and data obtained from pilot study conducted as Task 5 of the feasibility evaluation would be used to inform the interpretation of the full-scale evaluation. Comparison of outcomes linked to individuals through existing database would be compared to those obtained through CVs and other sources. This will include an assessment of recall and precision in the linking of multiple outcomes including but not limited to publications and patents.

b. Plan for Dissemination

There are three direct target audiences for an outcomes evaluation: program administrators, NIH/NCI leadership, and former program fellows. In addition to these direct audiences, other evaluators in both program and academic settings may derive benefit from this study, both in the explication of methods and in a better understanding of program theory. Although data for some or all study groups may be obtained as part of a full-scale evaluation, dissemination of results for specific groups would be limited to certain target audiences. In particular, access to outcomes for the NSF SDR comparison group, other NCI intramural postdoctoral appointees, and/or R25T trainees may be limited to only CPFP program administrators for internal comparison. One scheme is proposed in **Table 10**.

CPFP Program Administrators. For purposes of determining the effectiveness of the CPFP program and possible program adjustments, administrators will have access to data tables for all comparison groups for which data is available. This should include all CPFP fellows, CPFP applicants, doctoral recipients identified from the NSF SDR, postdoctoral fellows at NCI not involved in a structured fellowship program, R25T Trainees, and F32 Trainees. This would enable administrators to address the evaluation questions posed in Task 2 and to maintain a record of performance for future evaluations. This report should include a hard copy and electronic form of the final report and a slide deck for presentations.

NCI/NIH Leadership. For purposes of communicating program performance and impact, the final report with aggregate findings and recommendations may be made available in hard copy or electronic format to NCI/NIH Leadership. Findings and recommendations may be used to support, for example, OMB PART reporting. Individual-level data will not be provided for any of the study groups, however quotes from program participants (with permission) should be considered to demonstrate program impact.

Current and Former CPFP Fellows and Applicants to the CPFP program. For the purposes of recruiting, former fellows and applicants will have access to the final report with aggregate findings and recommendations. Individual-level data will not be provided for any of the study groups. Outcomes and process evaluation measures should be aggregated across individuals among all CPFP fellows, CPFP applicants, and F32 Trainees to enable a comparison of the observed impact of the CPFP program on career outcomes. For applicants, this may affect their decision to apply or, if offered a position, their decision to enter the program. In addition, study findings and personal quotes should be considered for inclusion in printed recruitment materials for dissemination to potential applicants to the CPFP program.

Table 10. Description of potential target audiences for information regarding specific target study groups.

Study Groups Presented Target Audiences	CPFP Fellows	CPFP Applicants	NSF DRF	Other NCI Intramural Postdocs	R25T Trainees	F32 Trainees
CPFP Program Administrators	✓	✓	✓	✓	✓	✓
NCI/NIH Leadership	✓	✓				
Current and Former CPFP fellows	✓	✓				✓
Applicants to the CPFP program	✓	✓				✓
Training program directors	✓	✓				✓
Research and evaluation communities	✓	✓				✓

Check marks indicate target audiences among whom data regarding specific study groups might be shared.

Training Program Directors. Directors or administrators of training programs in other federal agencies or in the extramural community may access the results of a full-scale evaluation of the CPFP program including data aggregated by study group among all CPFP fellows, CPFP applicants, and F32 Trainees. The methodologies used for the full-scale evaluation may be of us, or the aggregated results may be used as a comparison to findings regarding their alumni.

Research and Evaluation Communities. Researchers in the academic or scientific community may access the results of a full-scale evaluation of the CPFP program including data aggregated by study group among all CPFP fellows, CPFP applicants, and F32 Trainees. While some individuals in the target audience may be interested in the methodology and the differences in those methodologies by comparison groups, others may be interested in the outcomes of a specific comparison group. However, due to privacy concerns individual-level data will not be provided for any of the study groups Dissemination to this audience may take the form of the study report, conference presentations, and publication of study methods and findings in scholarly journals.

VII. Estimated Cost, Timeline and Resource Requirements

Task 1: Identification of individuals. Task 1 involves preparation of data for the main study group, the identification of comparison groups, and analysis of demographic information. This would include sampling multiple data sources and determining the reliability and validity of available personal level demographic information. The deliverable for this task would include documentation on data quality and justification for choosing the comparison groups within the context of the evaluation objectives.

Main study group (Task 1a) would be composed of all CPFP alumni. Names are available from the CPFP alumni database in a form that requires minimal data cleaning. A total of 186 individuals are named, with some exclusions to be made based on annual reports and input from CPFP staff.[1] Estimated time required

[1] The number of CPFP alumni to be included for the full-scale evaluation is dependent on inclusion criteria which will be assessed using annual reports and CPFP administrator feedback. For example, one individual out of 20 sampled as part of the pilot study within the feasibility evaluation was excluded as that individual did not complete the fellowship.

to format, load and prepare these data for analysis is 52 hours.

Comparison group 1 (Task 1b) would be composed of CPFP applicants. This comparison group is included to examine the composition of the applicant pool and to compare research performance with program participants. These individuals may be identified from the CPFP applicant database with contact information current as of the year of application (between 1987 and 2011). Three individuals would be randomly sampled from each class entering between 1987 and 2008 for a total sample size of 66 (3% sample of 2,015 applicants).[2] To maintain a representative sample of the applicant pool, a simple random sample would be taken from all applicants from a given year and applicants would not be stratified by other characteristics. In order to prepare data for use in subsequent steps, data must be loaded and formatted, individuals from this database must be identified, data cleaning and name standardization must occur, and quality checks must be performed. The estimated time required is 72 hours.

Comparison group 2 (Task 1c) includes matched cases from eligible doctoral graduates. These individuals would be included to examine the larger pool of similar doctoral-trained individuals and to compare the impact of the NCI post-doctoral program versus no specific post-doctoral program. Individuals would be identified from two data sources: the NSF SDR/DRF and AAMC Student Data System. A base population would be defined within the NSF DRF by identifying all individuals who obtained PhDs in the field of study and institutions from which CPFP alumni obtained their PhDs. From this base, 3 individuals obtaining degrees between 1987 and 2008 would be randomly sampled for each year (<1% sample per year). This will be repeated for the AAMC Student Data System for those obtaining MDs but restricted only to matched institution rather than institution and field of study. Sixty-six PhDs and 66 MDs would be included for a total of 132 individuals in this comparison group. Identification of individuals from each database would require data to be loaded and formatted, relevant fields of study to be defined, and institutions enumerated. In addition, data cleaning, name standardization, and quality checks must be performed. The estimated time required is 212 hours.

Comparison group 3 (Task 1d) would be composed of training program participants from R25T programs similar to CPFP and funded by NCI. This group would be included to examine the impact of the CPFP program in comparison to other similarly structured post-doctoral programs. These individuals may be identified from grant images in NIH IMPACII. Individuals are available from a range of years, but would be included only if they enter the program between 1987 and 2008. Current estimates of the number of individuals who may be identified through this method is 62, of which all would be included (100% sample). Inclusion of these individuals would require manual review of grant images, single-entry of those names manually into a database,[3] data cleaning, and quality checks. The estimated time required is 92 hours.

Comparison group 4 (Task 1e) consists of individuals funded by NCI through the F32 mechanism who would be included to examine the effect of the structured CPFP program compared to the effect of an unstructured post-doctoral program. These individuals may be identified directly from NIH IMPACII. Three individuals with funding starting in each year between 1987 and 2008 would be randomly sampled (5% sample).[4] Data cleaning, name standardization, and quality checks must be performed and would require 52 hours.

A summary of study groups, sampling scheme, and effort required is presented in **Table 11**.

[2] A larger sample may be taken if desired. This would incur limited additional cost for Task 1b and greater additional cost in Task 2 (Match names).
[3] Independent, double-entry of data by two individuals and reconciliation of the two entries may be performed with an additional 40 hours of effort at the Junior Analyst level and 20 hours at the Senior Engineer level.
[4] As with Task 1b, a larger sample may be taken if desired, incurring limited additional cost for Task 1e and greater additional costs in Task 2.

Table 11. Summary of proposed study groups, sample sizes to be included in the full-scale evaluation, and hours of effort required to identify individuals within each group.

Study Group	Included Sample Size	Base population size	Percent of base population	Proportional size wrt to Main Study Group	Total Staff Hours
Main Study Group: CPFP Alumni	186	186	100%	--	52
CG1: CPFP Applicants	66	2,015	3%	35%	72
CG2: Matched doctoral recipients	132	5-9,000/yr	<1%	71%	212
CG3: R25T Trainees	62	62	100%	33%	92
CG4: F32 Trainees	66	1,337	5%	35%	52

Task 2: Match names. Task 2 involves matching names for individuals identified in Task 1 to existing data sources used for outcome ascertainment. Twenty hours is allotted to load and format each data source which is not already available in-house.[5] Items performed as part of this task would include name disambiguation within and across multiple data sources. The estimated time required to match names from Task 1 for all five study groups combined to outcomes from each data source is as follows[6]: 50 hours for NIH IMPACII; 50 hours for Discovery Logic's ScienceWire (for inclusion of NSF, DoD, and USDA grants); 60 hours for AAMC Faculty Roster; 30 hours for CPFP alumni database; 60 hours for PubMed/Medline; 60 hours for Web of Knowledge; and 80 hours for society membership lists. For data cleaning and quality checks, an estimated 5 hours is required for every 100 individuals included across study groups. The estimated cost provided in **Table 12**

[5] This estimate includes the AAMC Faculty Roster, 2 society membership lists, and the CPFP alumni database.

[6] The proposed approach involves a coarse query performed by a Senior Engineer with manual review of individual matches by a Junior Analyst. For a sample size beyond the 512 individuals proposed for the five study groups combined, an automated approach may be necessary and would incur additional hours by the Senior Engineer and a reduction in hours for the Junior Analyst.

includes performing this task for all 5 study groups (N=512; 186 alumni, 66 for CG1, 132 for CG2, 62 for CG3, 66 for CG4). The deliverable for this task is a written document on coverage of existing databases and descriptive statistics for individuals in each study group. Total estimated time required is 514 hours.

Task 3: Categorization of cancer- and cancer-prevention related grants and publications . Task 3 involves creating a categorization scheme for cancer- and cancer prevention-related grants and publications. The deliverable for this task would include documentation on methodology and descriptive statistics for each study group.

Manual review of a sample of 300 publications and all grants (method 2 in Appendix 3 of the final report, Task 3a) is estimated to require 332 hours, while alternative, automated methods for review of all publications and all grants (methods 1 and 3, Task 3b) are estimated to require 192 hours.

Task 4: Analysis for all study groups using existing data sources. Task 4 involves analysis and reporting of outcome measures for all study groups using existing external data sources. The deliverable for this task would include a written summary of relevant outcome statistics for each study group, comparisons across study groups, and analysis of relevant sub-groups. Outcomes include but are not limited to total publications, total grants, cancer- and cancer-prevention related publications and grants, mean or median citations and journal impact factor, current employment and position, and collaboration and authorship activities through publications. Estimated effort for this task is 344 hours.

Task 5: Development and piloting of additional data collection instruments. Task 5 involves the development of survey instruments for the online survey, which includes a combination of quantitative and qualitative assessments (Task 5a); and for the in-person interviews, which contain strictly qualitative assessments (Task 5b). For both instruments, the contractor would pilot test the items with a focus group, review and revise items in consultation with CPFP, and create a script for administering the instruments as appropriate. Two months is allotted for this task with 136 hours of effort for the online survey and 268 hours for the in-person interview instrument.

Task 6: Obtain OMB Clearance. This task involves applying for clearance to the Office of Management and Budget to administer a new data collection instrument to individuals identified from Task 1a. The steps involved in this process are outlined in Task 8 of the feasibility evaluation and should include preparation of statements of support, Federal Register Notices, etc. Once the package for OMB clearance is created, it may still take upwards of 180 days (26 weeks) to complete the OMB process and obtain approval. In addition to the OMB package, an NIH Privacy Impact Assessment must be submitted by the contractor, including evaluation of personally identifying information in web-based and hard copy data collection forms for additional data collection, security of the physical and/or electronic locations where data from additional data collection and existing databases would be stored, and methods of use and sharing of collected information with respect to protecting the identity of survey respondents. The PIA would specifically address the data points collected using the additional quantitative and qualitative assessments developed as a result of the pilot studies described in Task 6, as well as the data to be retrieved from existing data sources. The PIA would require 2 months of effort. In total, the estimated timeline is 8 months for this task, with 120 hours of effort.

Task 7: Dissemination of instrument, data collection and analysis of data from additional instruments. Task 7 involves obtaining and cleaning contact information for respondents, administration of the surveys, collection and compilation of responses, data cleaning, and analysis.

For an online survey administered to all CPFP alumni (Task 7a), two months is allotted for data collection.

Data analysis in consultation with CPFP would occur over a period of two months. Estimated effort for this task for the online survey is 124 hours.

Costs for a qualitative assessment are estimated for a sample of 20% (N=36) and 50% (N=90) of CPFP alumni with two months allotted for data collection. Data analysis in consultation with CPFP would occur over a period of three months with estimated effort required being 280 hours for a 20% sample and 530 hours for a 50% sample.

Task 8: Final written report. A final report would be compiled of findings from analysis of existing databases and additional qualitative and qualitative data collection instruments. The report would be 508-compliant. Five weeks are allotted for this task with estimated effort of 156 hours.

Task 9: Online resources for dissemination of findings. The findings reported in the final report would be developed into a presentation slide deck for CPFP program administrators and an online resource accessible to various target audiences under the scheme proposed in Task 10 of the feasibility study. Three weeks are allotted for the completion of this task with estimated effort of 92 hours.

Estimated timeline and cost is described in **Table 12** as months allotted per task in the text and estimated week in which the task is due. Resources required are described as hours of effort for the full-scale evaluation and staff hours. Tasks 1-4 would be conducted in parallel with Tasks 5-7.

Tasks 3a and 7b are not included in the estimate of the final cost as they are presented as alternatives to Task 3b and 7c respectively.

Table 12. Description of estimated cost and timeline for tasks in a full-scale evaluation.

Task	Description	Due in week	Labor Category	Staff Hours	Total Hours	Deliverable(s)	Cost of Task
1a	Identification of individuals among CPFP alumni (main study group) and demographic analysis	2	Project Mgr	4	52	Documentation and methods for choosing and justifying for chosen study groups	$ 8,275
			Sr. Analyst	4			
			Sr. Engineer	24			
			Jr. Analyst	20			
1b	Identification of individuals among CPFP applicants (comparison group 1) and demographic analysis	6	Project Mgr	4	72	Documentation and methods for choosing and justifying for chosen study groups	$ 10,875
			Sr. Analyst	4			
			Sr. Engineer	24			
			Jr. Analyst	40			
1c	Identification of individuals among matched eligible doctoral recipients (comparison group 2) and demographic analysis	6	Project Mgr	4	212	Documentation and methods for choosing and justifying for chosen study groups	$ 30,075
			Sr. Analyst	4			
			Sr. Engineer	44			
			Jr. Analyst	160			
1d	Identification of individuals among R25T trainees (comparison group 3) and demographic analysis	6	Project Mgr	4	92	Documentation and methods for choosing and justifying for chosen study groups	$ 12,475
			Sr. Analyst	8			
			Sr. Engineer	0			
			Jr. Analyst	80			
1e	Identification of individuals among F32 trainees (comparison group 4) and demographic analysis	6	Project Mgr	4	52	Documentation and methods for choosing and justifying for chosen study groups	$ 7,275
			Sr. Analyst	8			
			Sr. Engineer	0			
			Jr. Analyst	40			
2	Match names in study groups to existing data sources for outcome ascertainment	12	Project Mgr	8	514	Written documentation on coverage of existing databases for each study group, descriptive statistics for each study group	$ 76,849
			Sr. Analyst	16			
			Sr. Engineer	180			
			Jr. Analyst	310			
3a	Categorization of cancer- and cancer-prevention related grants and publications (manual categorization of a of 400 sample publications and all grants)	38	Project Mgr	4	332	Document methodology and descriptive statistics for each group	$ 43,675
			Sr. Analyst	8			
			Sr. Engineer	0			
			Jr. Analyst	320			
3b	Categorization of cancer- and cancer-prevention related grants and publications (automated categorization of all publications and grants)	38	Project Mgr	4	192	Document methodology and descriptive statistics for each group	$ 28,475
			Sr. Analyst	8			
			Sr. Engineer	60			
			Jr. Analyst	120			
4	Analysis for all study groups using existing data sources	40	Project Mgr	8	344	Written summary of outcome statistics for each study group	$ 49,749
			Sr. Analyst	16			
			Sr. Engineer	80			
			Jr. Analyst	240			
5a	Development and piloting of additional data	8	Project Mgr	8	136	Develop additional data collection instrument and	$ 20,309

	collection instruments for online survey		Sr. Analyst	8		database for online survey	
			Sr. Engineer	40			
			Jr. Analyst	80			
5b	Development and piloting of additional data collection instruments for in-person interview	8	Project Mgr	8	268	Develop additional data collection instrument and database for in-person interviews	$ 39,069
			Sr. Analyst	20			
			Sr. Engineer	60			
			Jr. Analyst	180			
6	Obtain OMB Clearance for a new data collection instrument and submit Privacy Impact Assessment	42	Project Mgr	4	120	Application package including statements of support, Federal Register Notices, etc.	$ 16,515
			Sr. Analyst	8			
			Sr. Engineer	8			
			Jr. Analyst	100			
7a	Dissemination of instrument, data collection and analysis of data from additional instruments: online data collection instruments of all CPFP alumni*	60	Project Mgr	8	124	Disseminate online survey to CPFP alumni, collect data, and perform analysis and documentation of findings as described in Task 7 of feasibility study	$ 18,149
			Sr. Analyst	16			
			Sr. Engineer	20			
			Jr. Analyst	80			
7b	Conducting survey, data collection and analysis of data from additional instruments: in-person interviews of 20% sample of CPFP alumni*	64	Project Mgr	24	280	Development additional data collection instrument for in-person interview, conduct survey, collect data, and perform analysis and documentation of findings among a 20% sample of CPFP alumni	$ 39,888
			Sr. Analyst	40			
			Sr. Engineer	16			
			Jr. Analyst	200			
7c	Conducting survey, data collection and analysis of data from additional instruments: in-person interviews of 50% sample of CPFP alumni*	64	Project Mgr	24	530	Development additional data collection instrument for in-person interview, conduct survey, collect data, and perform analysis and documentation of findings among a 50% sample of CPFP alumni	$ 72,388
			Sr. Analyst	40			
			Sr. Engineer	16			
			Jr. Analyst	450			
8	Final written report	69	Project Mgr	16	156	Documentation of findings of full-scale evaluation	$ 21,739
			Sr. Analyst	16			
			Sr. Engineer	4			
			Jr. Analyst	120			
9	Online resources for dissemination of findings	72	Project Mgr	4	92	Develop and deliver online resource for dissemination of findings	$ 13,475
			Sr. Analyst	8			
			Sr. Engineer	20			
			Jr. Analyst	60			
	Travel costs for in-person interviews					50 interviews @ $400 per interview	$20,000
	Email distribution for online survey						$500
Total Estimated Cost **							**$ 446,192**

* OMB clearance may take up to 180 days to obtain. Instruments will be disseminated and administered as soon as clearance is obtained.

** Includes all study groups (1a, 1b, 1c, 1d, 1e) , automated categorization of publications and grants (3b), online survey (5a, 7a), 50% sample for in-person interview (7c); excludes manual categorization of publications and grants (3a) and 20% sample for in-person interview (7b).

Tasks costs are calculated based on an hourly rate of $158.68 for Project Manager, $180.00 for Senior Analyst and Senior Engineer, and $130.00 for Junior Analyst.

Additional costs (ODCs) may be necessary to obtain access to select datasources to support the outcomes evaluation.

VIII. Appendix 1: Literature and Resource Review

Methods

To obtain publications with methods for obtaining follow-up information for alumni of a program for the purpose of evaluating career outcomes, the following key word terms were applied: "(follow-up OR longitudinal) AND alumni". Measures of career outcomes or programmatic process measures relevant to CPFP participants was searched using "(career outcome OR outcome measurement) AND (research AND (doctoral OR doctorate)) ". Articles with evaluations of program goal attainment for career development programs such as fellowships, internships, or other educational interventions or programs as they relate to career outcomes regardless of field of interest were searched using "program evaluation AND career outcome". In addition, peer-reviewed publications were searched for the key words "professional career outcome program evaluation", "training program" evaluation, and "career" or "intramural".

MeSH terms were identified from relevant publications which could also be found within the PubMed. The relevant MeSH terms from these publications were then combined to execute a similar search in PubMed from which no additional publications were identified.

A third search was executed in Google to identify information regarding the evaluation of career development programs. Search phrases used were: "evaluation of publicly funded fellowship programs", "'career outcomes' fellowship program evaluation", and "intramural training program evaluation".

The databases of known sources of potentially relevant information were searched using the keywords "career outcomes", "academia", "faculty", "fellowship evaluation", and "internship evaluation". These sources included the database of electronic reports from the National Academies of Science, Educational Testing Services, the National Bureau of Economic Research, Mathematica Policy Research, RAND Corporation, RTI, and Educational Resources Information Center (ERIC), and the NIH Office of Evaluation website.

A summary of study characteristics and findings from intra- and extra-mural research training programs are presented in **Table A1.1**.

Due to particular interest in the area, an additional search was conducted to examine qualitative approaches used in program evaluations (**Table A1.2**). These articles were identified from Web of Knowledge using either "career outcome", "fellowship", "post-doctorate", "training program", or "internship" in conjunction with "qualitative assessment", "in-depth interview", or "focus group". Just under 200 additional records were identified, of which 9 were relevant for the current review. Evaluations included as relevant were those which conducted a qualitative assessment of any program - not limited to evaluations of programs for research training - and included several examples of evaluations of programs to develop skills in medical practice as well as programs that address a mixtures of practice, administration, and research. In addition, one reference from the Google search was added to this table to reflect the qualitative assessment conducted as part of that study (Russia-US Young Leadership Fellows).

A complete list of reference may be found in the body of the Task 3 of the feasibility evaluation study.

Table A1.1. Summary of evaluations of research training programs.

Program (Sponsoring Institute/Agency)	Date of Evaluation	Field/Area	Description	Measures		Existing/External Databases	Primary data collection (N, Response Rate) Comparison Group	Findings
				Process Evaluation	Outcome Evaluation			
Intramural Research Training Programs								
Cancer Prevention Fellowship (NIH/NCI)	1987-1997	Cancer research	Postdoctoral fellowship, 3-year	None	Publications	Web of Knowledge/ISI	Annual progress reports, CVs (66, 100%) None	Publication output increased pre-program compared to post-program. Younger age, having an MD rather than a PhD, and pursuit of an MPH during the program were associated with a greater increase in publication output.
Cancer Research Experiences for Students (University of Alabama)	1999-2008	Cancer research	Health professional training, short-term	None	Current activities related to cancer research	None	Email survey, CV collection None	Article focused on tracking methods. Findings to be reported in later publication.
National Research Council Resident Research Associateship Program (RAP) (National Institute of Standards and Technology)	1965-2007	Science, Technology, Engineering, Mathematics	Postdoctoral associateship, 2-year	Applications and awards, experiences during the program, quality of work	Publications, presentations, patents, awards during appointment, perceived long-term value, current appointment	NSF SED, SDR	Participant surveys, administrative data, application data (1035, 38% RR) Applicants to other federal RAPs	Outreach efforts produced a greater number of qualified applicants than the program could accept. Program alumni were as productive in terms of publication output as graduates from other similar programs. However, these findings were limited by low response rates, high potential for bias, and little data available for comparison groups.
Cloister and Medical Fellows Programs (Howard Hughes Medical Institutes)	1987-1995	Health	Research training program, 1-year	None	Receipt of NIH postdoctoral awards and R01 funding, faculty appointments with research responsibility	NIH Trainee and Fellow File, AAMC Faculty Roster System and student data system	Administrative data (484) Unsuccessful applicants	Participation in the program was associated with increased likelihood of receiving NIH postdoctoral support and receiving a faculty appointment with research possibility at a medical school.
Building Interdisciplinary Research Careers in Women's Health (University of Michigan)	1999-2002	Health	Mentored research positions, 2 to 5-year	Time to meet with mentor, developing common language across interdisciplinary programs,	Research funding	Unclear	Unclear (10) None	Seventy percent of evaluated participants received external funding. All had obtained faculty positions, and 70% were in tenure track appointments.

				submission of grants, abstracts and publications				
Clinical Research Training Fellowship (NIH/National Institute of Dental and Craniofacial Research)	2000-2005	Health	Research fellowship, 1 to 3-years	None	Publications, clinical studies completed, academic position after training, subsequent training	Unclear	Unclear (11) None	All but one of the participants initiated a clinical trial resulting in a publication during the program. The career paths after program completion were diverse including entry into clinical practice, academic or research positions, pursuit of a PhD, pursuit of postdoctoral fellowship, or clinical residency. Six received intramural or extramural NIH funding.
Cancer Genetics Career Development Program (City of Hope)	2001-2004	Cancer research	Academic, experiential, or research training, 4-year	Academic progress, clinical evaluation	Academic position, publications	None	Administrative data, participant exit interview (12) None	The majority of trainees continued in cancer genetics after program completion. All had either presented abstracts, published an article, and/or were awarded cancer genetics research grants .
Elective research year in orthopaedic residency (Penn State University College of Medicine and the Milton S. Hershey Medical Center)	1976-2005	Health	Research residency, 1-year	None	Time devoted to clinical vs. academic practice, clinic or basic science research, teaching, administrative duties, ranking, publications	PubMed	Participant surveys (96) Clinical residents from the same program	There was no difference in the proportion of clinical versus research residents who entered academic practice or private practice. The research residents published significantly more articles than clinical residents during the program, but this difference diminished after the residency.
Oregon Center for Complementary and Alternative Medicine research training program	Unclear	Health	Mentored research training program	None	Grants, publications, abstracts submitted, other training received	None	Unclear None	As a result of the program, participants submitted 18 grants, presented 4 papers, submitted 7 articles, developed 2 treatment protocols, 1 participant earned a MPH, and another earned a graduate certificate.
Extramural Research Training Programs								
Clinical Research Training Program (American Cancer Society)	1996-2002	Cancer research	Mentored research grant, 3-year	None	Current research activity, academic position, publications, relationship	Medline	Participant survey, CVs (53) Unfunded	There was no significant difference in publication output between funded and unfunded individuals. However, both prior research and publications were associated with

					between training institution and current institution		applicants	subsequent funding.
Markey Scholars Program (Markey Trust)	1985-1991	Health	Postdoctoral fellowship, up to 3 years followed by funding as faculty, 5 years	None	Publications, grants, academic position, time to tenure, academic institution	CRISP, Web of Science	CVs, administrative data, participant interviews (99, 51.5%) Unfunded applicants	Markey Scholars had higher publication output, number of R01 grants, and academic rank, shorter time to tenure, and held positions in more highly-ranked academic institutions than the comparison group. There was, however, no difference in total number of NIH grants between the two groups.
NSF Graduate Research Fellowship Program (NSF)	1979-1993	Science, Engineering	Doctoral fellowship, 3-year	Perceptions of program	Degree completion, publications, academic honors, institutional service	NSF SED and SDR, NSF/NIH postdoctoral and research grant files, AAU/AGS Doctoral Education Database	Graduate Student Follow-up Survey (720, 50-68%) Peers matched on discipline, year of entry and institution	The fellowship program remains a prestigious and competitive program. However, despite financial support, about a quarter to a half of fellows do not complete the PhD after 11 years.
California Breast Cancer Research Program (State of California)	1999-2006	Cancer research	Fellowship program, 6-month to 3-year	Timeliness of receipt of grant money	Impact of award on career choice, current position, future career plans, publications, patents, presentations, grants	None	Online survey of fellows, telephone survey and CVs assessed in a sub-sample (100, 74% RR; 13 for sub-sample) None	Publication output for fellows from this program was lower than that reported for other similar programs although fellows were still successful at disseminating findings that resulted from program funding. However, a large portion of fellows are retained in the field of breast cancer research as a result of the program.
F32 postdoctoral fellowships (NIH)	1980-2000	Health	Research fellowship, up to 3-year	None	Publications, citations, and subsequent grant funding from NIH or NSF	Consolidated Grant Applicant File, Trainee and Fellow File, NSF grants database, WOS	None R01 applicants	Receipt of either type of grant resulted in an increase of 1 publication over a period of five years, interpreted as a limited effect on publication output. This represented a difference of 20% for F32 recipients and 7% for R01 recipients.
Human Frontier Science Fellowship (Intergovernment)	1990-1995	Brain function, biologic	Fellowship, up to 2-year	Satisfaction with program	Retention in field of research	None	Unclear None	Nearly all the fellows remained or planned to remain in the same research field, or a closely related

		function						field. About a quarter of respondents who fellowship had ended had found a tenure track position, and another 14% had found non-tenure track positions.
Minority Research Training Programs (NIH)	1970-1999	Health	Training grants, variable duration for undergraduate, graduate, post-doctoral, and faculty levels	Participation in and perception of program components	Degree completion, academic position	IMPAC, NIH Trainee and Fellows File, SED, AAMC Medical School Graduation Questionnaire, CRISP	Computer-assisted telephone interviews with administrators and trainees (951, 78%) Minorities in other programs, non-minorities in other programs	This study concludes that the programs aided minority individual in entering the biomedical workforce.
NATO Postdoctoral Fellowship Programs (NSF)	1959-1981	Science	Fellowship, 1 to 2-year	None	Current employment, research support, academic position, research prizes, membership in the National Academies	NSF database of awards, NIH electronic database, NATO listing of PIs, National Academies membership database	Unclear (833, 75.4%) NSF post-doctorates from the same period, those who were offered NATO fellowship but declined	Overall research support, as well as funding from specific agencies were similar across all three groups. Likewise, time until obtaining full professor rank was similar across the three groups.

The number of participants indicated as surveyed or evaluated for primary data collection may reflect either the number who responded or the number of original participants in the program during the reference period. The number reported is dependent on what was reported and are intended to provide an estimate of the size of the program and evaluation activities undertaken. Comparison groups for whom career outcomes were not evaluated but demographic information were compared were not included in the description of comparison groups for this table.[1]

Table A1.2. Summary of program evaluations using qualitative assessments.

Program (Sponsoring Institute/Agency)	Date of Evaluation	Field/Area	Description	Identified Themes		Description of interview	Primary data analysis method (N, Response Rate)	Findings
				Process	Outcomes			
Family Medicine Faculty Development Program (University of North Carolina)	Unclear, estimated 1998	Family medicine practice, teaching, administration, research	Faculty career development program, 1-year, part-time, extramural	Curriculum, program conditions	Career vision, confidence	60-90 minutes, individual interviews	Unclear (16, 100%)	The program aided in clarifying career vision and resulted in participants pursuing their ideal position in academic family medicine.
Rabkin and Mount Auburn fellowships in medical education (Harvard teaching hospitals)	2005-2006	Medical education evaluation, leadership	Faculty development program, 1-year, intramural	Concepts and skills in medical education, community, reflective practice, project evolution	Identity, confidence, career development, perceptions of others	30 minutes, individual interviews	Grounded theory, constant comparative method (40, 93.0%)	The study identified themes that are essential elements of faculty fellowships in medical education and which promote the professional development of the medical educator rather than focusing on career outcomes.
Rural Training Track of the Family Medicine Residency (University of Texas Medical Branch at Galveston)	2004	Family medicine	Unclear	Unclear	Unclear	Focus group discussions, duration unclear	Unclear (7, unclear)	The majority of graduates entered practice in rural areas.
Rural Family Medicine Residency (University of Calgary in Alberta)	2004	Family medicine	2-year residency	Level of preparation for practice	Intended career path	Focus group discussions and individual interviews, durations unclear	(18, 56.3%)	The study found that the program's effort to recruit individuals to rural practice were unsuccessful and may require re-examination of policies and approaches to encourage recruitment and retention.
Nurse Externship Program (Villanova University)	Unclear	Nursing	Summer externship program for graduate nurses	Integration into environment, gaining awareness and becoming frightened	None	Focus group discussion, 1-hour	Kreuger (6, 46.2%)	The study found that the program allowed individuals to experience some of the realities of the transition from student to professional nurse, though despite this exposure the transition still remains challenging.
Carol A. Ghiloni Oncology Fellowship Program (Massachusetts General Hospital)	Unclear, estimated 2008	Oncology nursing practice	10-week precepted educational experience for baccalaureate	Informed career choice, confidence-building, preceptor role modeling,	None	Focus group discussion, duration unclear	Downe-Wamboldt content analysis (4, 28.6%)	The study found that the fellowship program provides an opportunity to make informed career choices, confidence-building, preceptor role-modeling,

			nursing students	relationship-building				and an opportunity to build relationships with staff, patients, and patients' families.
Albert J. Solnit Integrated Research Pathway in Child and Adolescent Psychiatry Research Pathway (Yale University)	Unclear	Child and adolescent psychiatry and research	5-6 year residency program	Identity during rotations, group cohesion, mentorship, career development	None	Focus group discussion, duration unclear	Unclear (4, 66.7%)	The study found several challenges facing the integrated model including participant feelings of isolation during the program. Despite this challenge, the integrated approach seemed to decrease attrition compared to the pathway for residency in this field.
Integrated Research Pathway in Child and Adolescent Psychiatry Research Pathway (University of Colorado)	Unclear	Child and adolescent psychiatry and research	5-6 year residency program	Logistics, isolation during program	None	Focus group discussion, duration unclear	Unclear	
Russia-US Young Leadership Fellows for Public Service Program (U.S. Department of State)	2002	Public Service	1-year, academic exchange program for university graduates	Unclear	Unclear	Focus group discussion, individual interviews, durations unclear	Unclear (126, unclear)	Unclear.

IX. Appendix 2: Findings from the Pilot Study

Methods

Fellows entering in 2007 and later have yet to finish the program and therefore were not included in the sample for evaluation in the pilot study. Only those fellows entering during the years 1987-2006 were included.

One fellow was randomly sampled from each year among those not deceased and those who held a PhD or MD at entry (N=20). Names of these fellows were matched with individuals in Discovery Logic's People Database which contains information from PubMed, IMPACII, and US Patent and Trade Office patent database. Individuals entering the CPFP program with neither a PhD nor a MD were not included in the sample for feasibility evaluation due to small numbers. Disambiguation of names was performed manually.

Key Findings

In the overall cohort (N=184), 30 (16.3%) fellows entered the CPFP program with an MD, 143 (77.7%) entered with a PhD, 6 (3.2%) entered with both, 4 (2.1%) had a variety of other degrees (JD, DrPH, DDS), and one (0.5%) had no degree information available from the CPFP alumni database.

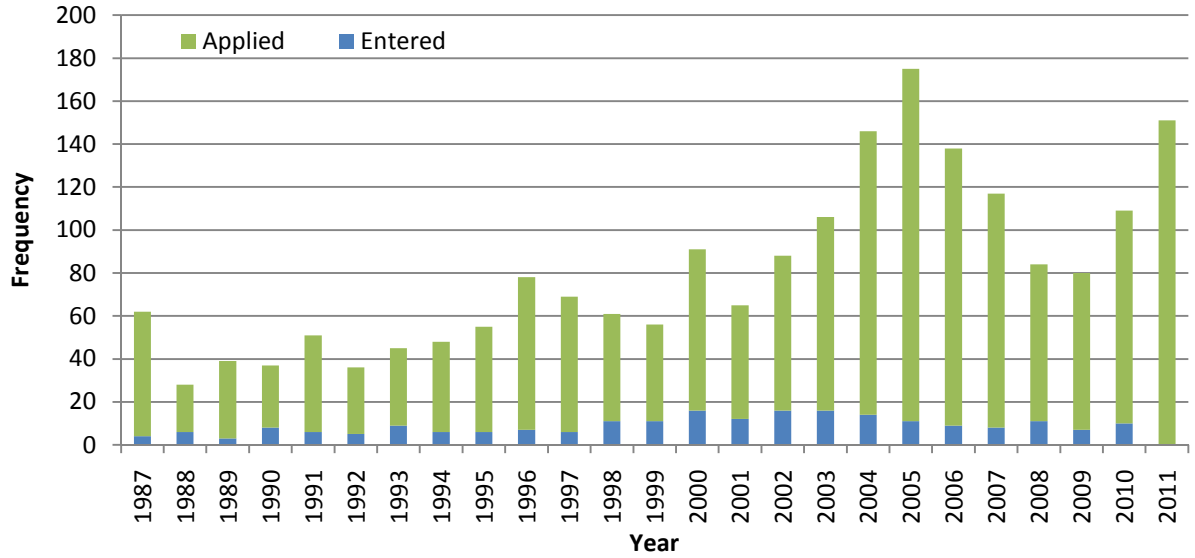

Figure A2.1. Number of applicants and entrants to the CPFP program by year.
Source: Number of applicants from CPFP applicant database; number of fellows who entered the program based on CPFP alumni database and applicant database for the years 2007-2010.

One hundred and twenty-three distinct individuals have served as preceptors since the start of the program (**Figure A2.1**). The majority of preceptors have mentored 1 student (N=76, 61.8%). Of these preceptors, 9 were previous CPFP fellows (7.3%), with an average of 1.56 fellows per preceptor. The year of entry into the CPFP program for preceptors who were past fellows ranged between 1987-1999, and their date of exit from the CPFP program ranged between 1989-2002.

Process Evaluation

Process measures, enumerated in
Table A2.1 and discussed in Task 4, were ascertained from the CPFP applicant database and alumni database.

Of the sampled cohort, 11 (55%) entered the CPFP program with a PhD, while 9 (45%) entered with an MD. No sampled individuals had both a MD and a PhD.

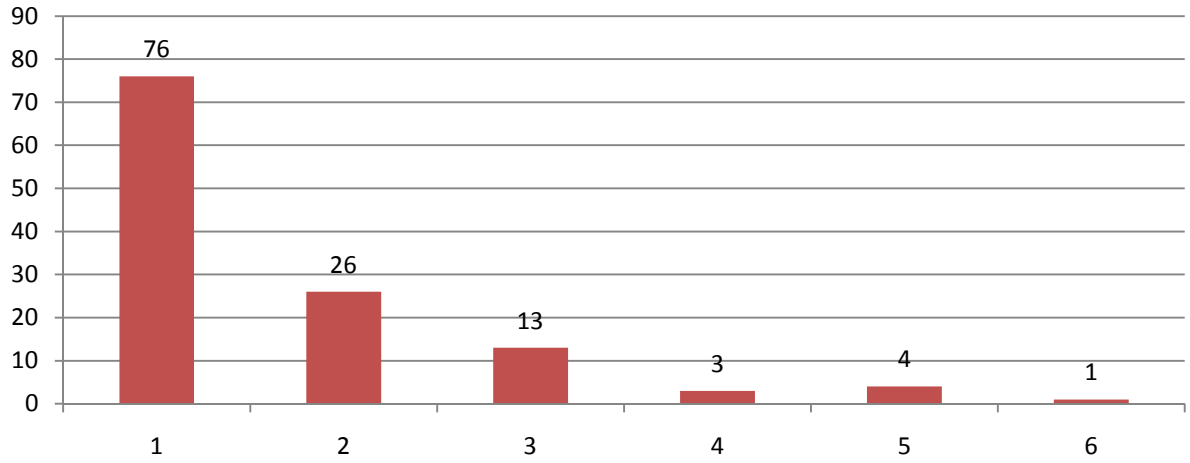

Figure A2.2. Frequency distribution of the number of fellows mentored by each preceptor (total number of preceptors=123).

Table A2.1. Fellows demographic information, application and selection scores, overall statistics on mentored research, and program completion.

Process Measures	Overall (N=20)	PhDs (N=11)	MDs (N=9)
Number of fellows	20	11	9
Race/Ethnicity			
Information not available	17	8	9
Caucasian	3	3	--
Application and Selection			
Information not available (*N*)	16	7	9
Application Score (*average, of 100*)	93.25	93.25	--
Application Z score (*average*)	1.13	1.13	--
Interview Score (*average, of 5*)	4.40	4.40	--
Mentored research			
Preceptors			
Number of fellows with listed no preceptors	4	0	1
Number of fellows with listed with 2 or more preceptors	4	2	2
Years in program (*average*)	2.9	3.0	2.7
Years since program entry (*average*)*	13.9	12.4	15.8
Years since program completion (*average*)*	11.1	9.4	13.1

*As of December 31, 2010.

Table A2.2. Description of preceptor identified among the sampled CPFP cohort.

Preceptor Characteristics				CPFP Fellow Characteristics	
Name	**Center/Division**	**PhD**	**MD**	**PhDs**	**MDs**
Ambs, Stefan	Center for Cancer Research	x		x	
Atienza, Audie	Division of Cancer Control and Population Sciences	x		x	
Ballard-Barbash, Rachel	Division of Cancer Control and Population Sciences		x	x	
Birrer, Michael	Center for Cancer Research	x	x		x
Brawley, Otis	Center to Reduce Cancer Health Disparities		x		x
Brown, Martin	Health Services and Economics Branch	x		x	
Dawsey, Sandy	Division of Cancer Epidemiology and Genetics/Cancer Prevention Studies Branch		x		x
Forman, Michele	Center for Cancer Research	x		x	
Henson, Don	Early Detection Branch		x		x
Horm, John	Division of Health Interview Statistics			x	
Glynn, Thomas	Division of Cancer Prevention and Control	x		x	
Kelloff, Gary	Division of Cancer Treatment and Diagnosis		x	x	
Maibach, Ed	Center for Strategic Dissemination	x		x	
Manley, Marc	Behavioral Research Program		x		xx
Massett, Holly	Office Of Market Research and Evaluation, Office of Communications and Education	x		x	
Portnoy, Barry	Division of Cancer Prevention	x		x	
Prorok, Philip	Biometry	x		x	
Schiffman, Mark	Division of Cancer Epidemiology and Genetics		x	x	
Smart, Charles	Early Detection Branch		x		x
Ziegler, Regina	Division of Cancer Epidemiology and Genetics	x			x
Zujewski, Joanne	Breast Cancer Clinical Research Section		x		xx

Each preceptor is listed with their center or division, degree, and the type of degree held by each fellow mentored form the sampled cohort.
Source: Center or division affiliation obtained from online search.

Limited information was available from the CPFP applicant database concerning demographics, and application and selection for CPFP efforts prior to 2002. Application scores and interview scores were not available for applicants prior to 2002.

Twenty distinct individuals served as preceptors to the 20 CPFP fellows sampled (**Table A2.2**). Although most fellows listed only 1 preceptor, some fellows did not list a preceptor and some listed multiple preceptors. Based on information regarding mentorship from the CPFP alumni database, 18 out of 20 preceptor-fellow pairs were concordant on academic degree (PhD vs. MD) (90.0%).

Information on participation in specific program components was obtained from fellows' annual progress reports (**Table A2.3**).

Current employment information was obtained from the CPFP alumni database (**Table A2.4**). Although employment data was available for most alumni in the pilot sample, it is anticipated that expansion to include all alumni for a full-scale evaluation will yield additional categories as well as finer subdivisions within sectors (inclusion of a 'government' sector to include NIH/NCI, CDC, FDA, etc. with subdivisions to distinguish between individuals involved in intramural research versus extramural program management).

Only three of the individuals in the sampled feasibility evaluation cohort could be found in the LinkedIn online database of CVs (data not shown). Of these, only two reported useful career outcome information and one individual listed CPFP under previous employment. Information available to those outside of each

fellow's network was limited to current position and select information regarding past employment and education.

Of the 20 individuals sampled, 16 (80%) could be linked to at least one record in the People database based on first name, last name, middle name and/or email address. Potential matches to individuals in the sampled CPFP cohort with common names (for example, William Anderson), were further investigated to determine whether it was likely that the People database record was the same individual. This assessment was performed using affiliation information, addresses, phone numbers, and date of birth (where available).

Using this matching method, outcomes related to funding were then ascertained from IMPACII (**Table A2.5**). The number of fellows matched to at least 1 grant on which the fellow served as the principal investigator was ascertained to be 4 fellows, or 20.0%. This appeared consistent given the number of fellows in industry, serving as program officers at NIH, or employed at other federal agencies.

Direct name-matching was performed to identify publications from CPFP alumni in PubMed and Web of Knowledge (**Table A2.5**). All outcomes were calculated from the time since the fellow finished the CPFP program based on the year of exit listed in the CPFP alumni database. Additional information on categorization of publications obtained from PubMed as cancer- and/or cancer prevention-related can be found in Appendix 3: Categorizing publications as cancer- and/or cancer prevention-related.

No patents or patent applications were made by individuals in the sampled feasibility evaluation cohort from USPTO (data not shown). No grants from National Science Foundation, the USDA, or the Department of Defense were identified for individuals in the pilot sample after searching in ScienceWire (data not shown).

Table A2.3. CPFP fellow participation in the MPH program and other professional development activities during the CPFP fellowship.

Process Measures	Overall (N=20)	PhDs (N=11)	MDs (N=9)
MPH Program			
Number of fellows earning MPH during CPFP	13	6	7
Degree-granting institution			
Johns Hopkins	4	2	2
Harvard University	1	1	--
George Washington University	3	--	3
Tulane	1	--	1
University of California - Berkeley	1	1	--
Unclear	3	2	1
Professional Development			
Effect Presentation Skills Training	2	1	1
Grants and Grantsmanship Workshop	8	5	3
Scientific Writing Workshop	2	--	2
Public Speaking Workshop	3	2	1

Source: CPFP Annual Progress Reports and CPFP applicant database

Table A2.4. Current employment and position based on the CPFP alumni database.

Outcomes	Overall (N=20)	PhDs (N=11)	MDs (N=9)
Employment and Position (CPFP alumni database)			
Sector			
Academic	4	4	--
NCI	5	3	2
Hospital/Medical Practice	4	--	4
Industry	2	2	--
Non-Profit Organization	1	1	--
Information not available	4	1	3
Position			
Director/Chair	2	--	2
Vice President	3	2	1
Faculty, unspecified	1	1	--
Principal Investigator	1	--	1
Research Staff	6	5	1
Senior Research Staff	2	2	--
Information not available	5	1	4

Source: CPFP alumni database, current as of spring 2010.

Table A2.5. Comparison of outcomes within overall sampled cohort, MDs, PhDs, and other degrees based on stated data sources.

Outcomes (Data Source)	Overall	PhDs	MDs
Publications (PubMed and Web of Knowledge)			
Former fellows publishing at least 1 paper since CPFP	19/20 (95.0%)	10/11 (90.9%)	9/9 (100.0%)
Average number of publications (*per fellow*)	22.6	22.5	22.6
Average number of co-authors (*average of average per fellow*)	6.2	5.5	7.0
Research Funding (IMPACII)			
All project applied for (including unfunded)			
Fellows with at least 1 application (*N, %*)	8/20 (40.0%)	4/11 (36.4%)	4/9 (44.4%)
Total number of projects for which fellow is PI	18	9	9
Average years until first application*	3.8	4.0	3.5
Average number of applications (*per fellow*)ǂ	0.9	0.8	1.0
Funded Grants			
Fellows with at least 1 grant (*N, %*)	4 (20.0%)	1 (11.1%)	3 (33.3%)
Number of grants	6	1	5
Average years until first grant*	4.0	3.0	4.3
Average number of grants (*per fellow*)ǂ	0.3	0.1	0.6
Total allocated funding	$8,760,244	$75,657	$8,684,587
Average allocated funding (*per project*)	$1,460,040	$75,657	$1,736,917
Grants by Agency/Center/Institute (*# Funded / # Applied for*)			
National Cancer Institute	5/14	1/7	4/7
Nat'l Institute of Diabetes & Digestive & Kidney Diseases	0/2	0/1	0/1
Agency for Health Care Policy and Research	0/1	0/1	--
Nat'l Cntr for Chronic Disease Preventn & Health Promotn	1/1	--	1/1

* Among those with at least 1 grant ǂ Among all fellows, regardless of whether they have a grant or not

Additional CVs and biographies were obtained from manual, online searches of employers and personal websites for 12 individuals. A high level of confidence was required to determine that the information found online was for the individual listed in the CPFP database (ie, if the individual listed the CPFP fellowship as an experience on the online resource). Of these, only 2 were complete CVs with 1 up to date as of December 2010 and the timeframe for the other unclear. The remaining 10 all included summaries of the individual's accomplishments, while only 5 included listings of select publications. Outside of CVs, no information was provided on research funding for specific projects.

Current position was found for an additional 3 former fellows, totaling 15 former fellows for which current employment and position could be determined using online resources. For 9 of these individuals, the location and position of current employment agreed between the online search and the CPFP alumni database. For 3, the information in the two data sources disagreed and for another 3 the information was missing in the CPFP database but available online.

In addition, the online biographies and CVs often listed whether the individual received an MPH and, if so, in what year. For at least 1 individual, the available CPFP Annual Progress Reports did not indicate that the individual received an MPH while in the program, while the online biography did (evidenced by the years during which he/she was engaged as a CPFP Fellow and when the MPH was received).

In general, the PubMed search yielded more publications per individual than the online search of CVs and biographies. In contrast, CVs tended to report more papers than the number identified from the PubMed search. However, a comparison of individual publications showed that there were errors of omission in both the online CVs, as well as the PubMed search.

X. Appendix 3: Categorizing publications as cancer- and/or cancer prevention-related

A comparison of several methods for categorizing publications in PubMed linked to the sampled feasibility evaluation cohort (N=397) as cancer- and/or cancer prevention-related will be conducted as part of the pilot study. The results of the proposed methodology may be used to inform recommendations for the full-scale evaluation.

Method 1: Each MeSH term appearing in at least one of the publications by CPFP fellows sampled in the pilot will be examined to determine whether it is cancer-related. A publication would then be considered cancer-related if at least one cancer-related MeSH term was applied to it. Among publications categorized as cancer-related, prevention-related terms will then be identified. In both steps (identification of cancer-related publications, and cancer prevention-related publications), the guidance of a subject matter expert will be necessary. Each publication can then be categorized as cancer- and/or cancer prevention-related once the relevant MeSH terms are identified.

Method 2: Two subject matter experts will read the abstracts of each publication identified for the pilot study or a sample of the publications and categorize each article into cancer- and/or cancer prevention-related groups.

Method 3: Discovery Logic has linked publications indexed in PubMed to the NIH grants that are acknowledged as having supported those publications. If the NIH grants are classified as cancer- and cancer-prevention related (e.g. RCDC terms), these linkages could be used to identify known examples of cancer- and cancer prevention-related publications. MeSH terms from these publications will be taken as case definitions to be applied to the larger body of literature linked to the CPFP fellows in the pilot study.

Additional methods may be developed and evaluated while conducting the evaluations of methods 1-3.

Publication-level concordance between methods will be examined, along with costs and benefits of each. Important considerations will include calendar-time and effort expended, expertise required, availability of information (full abstracts of articles vs. abstracts), etc. Analyses of such costs may be reported as part of the final report for the feasibility evaluation study so that a recommendation may be made for a full-scale evaluation.